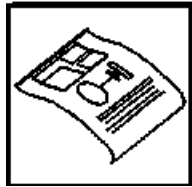


Improve Energy Efficiency with Duct Sealing

Builder Guide



DESCRIPTION

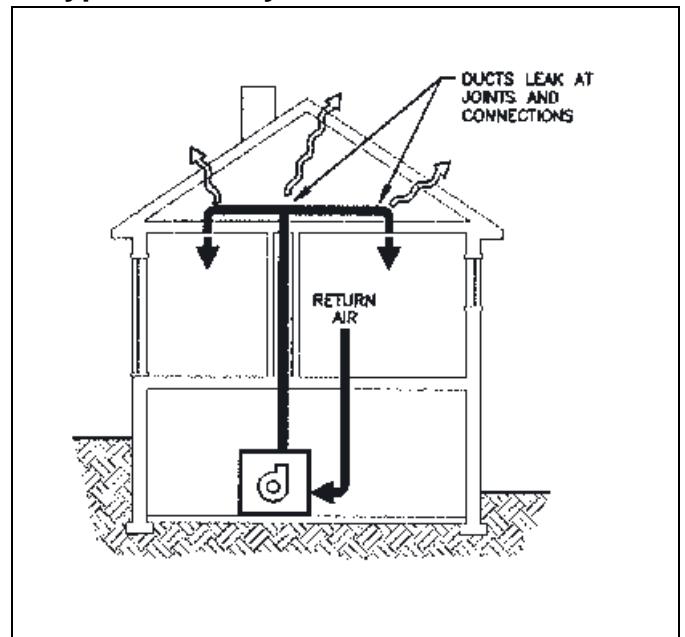
Duct systems are designed to supply air conditioned by the HVAC equipment to rooms, and recirculate - or return - the same volume of air back to the HVAC equipment. However, typical residential duct systems are so leaky that 15-20% of the conditioned air is lost from the supply ducts, and a similar volume of air is sucked in through return duct leaks. Since ducts are usually located in unconditioned spaces such as attics, crawl spaces, garages or basements, leaking supply ducts lose large amounts of cooled air in the summer, and leaky return ducts suck hot air into the air-conditioning system (if return ducts are located in the attic, this air can be more than 140°F). In winter, heated air is lost from leaky supply ducts and cold air is pulled into leaky return ducts located in unconditioned spaces. Duct leakage significantly increases heating and cooling loads, in many cases beyond what the HVAC system can handle.

Leaky return ducts located in an attic, crawl space, garage or basement not only reduce the HVAC system's ability to heat and cool a home, but can introduce unpleasant or dangerous dust, mold, odors, microbes and even radon gas into the home.

Even when the furnace or air conditioner is not running, leaky ducts waste energy by contributing to the overall air leakage of the house. In new tight houses, duct leaks can account for 20-25% of the total building air leakage.

Duct leakage is the result of improper duct design, installation and materials. Ordinary duct tape does not adequately seal joints between ducts - more stable, permanent materials are needed. Simple joints, such as those between similar duct sections, require manual sealing with foil tape (15-30 mil, butyl-backed) or mastic and fiberglass tape. Complex joints, such as joints between a round duct and a flat plenum, require careful manual sealing with mastic - or mastic plus fiberglass tape.

Typical Duct Systems Leak 15% to 20%!



BENEFITS

If properly sealed and insulated, the duct system in a house can significantly improve HVAC system efficiency. This leads to lower utility bills year round, and increased occupant comfort. Duct improvements can be a highly cost effective way to improve the quality of the homes you build, as well as increase customer satisfaction, customer referrals, and sales.

☐ Duct sealing can save money.

The energy saved by not having to heat and cool air leaking into and out of ducts can reduce space conditioning energy bills by 10-20%.

☐ **Tight duct systems are more comfortable.**

Occupants are more comfortable where more conditioned air reaches the registers. Homeowners are less likely to complain about heating and cooling problems, particularly "cold blow" from heat pumps, and homes will experience quicker recovery from night-time temperature setback.

☐ **Tightly sealed duct systems can reduce HVAC system costs.**

Sealed ductwork reduces the HVAC system load, which means that smaller, 'right-sized' HVAC equipment can be used (see the fact sheet on right-sizing HVAC equipment). This saves money, especially for high-end, high-efficiency equipment like ground-source or gas-fired heat pumps.

☐ **Tightly sealed duct systems can improve indoor air quality.**

Duct sealing can reduce the risk that leaky return ducts located in attics, crawlspaces, garages and basements will pull potentially contaminated air into the home.

☐ **Tightly sealed duct systems can reduce builder liability.**

Health and safety of occupants can be improved, and builder liability effectively reduced, where sealed ducts reduce the risk of back-drafting from gas or oil appliances and fireplaces. Back-drafting - or flue-gas reversal - can introduce carbon monoxide, combustion gases and smoke into the home. And when comfort is improved, builders are likely to experience fewer callbacks associated with HVAC performance.



INTEGRATION

☐ **Duct leakage testing is the only way to verify the job is done properly.**

For duct sealing to be effective, the duct system needs to be properly installed. Before sealing, verify that all ducts are fastened, supported and insulated. This will typically require additional quality control

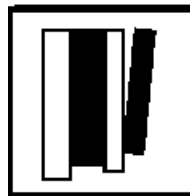
measures. Duct leakage should be measured before and after sealing to ensure quality and effectiveness (see the builder fact sheet on Duct Leakage Testing).

☐ **The HVAC contractor must understand insulation and sealing requirements prior to bidding the job.**

Since many HVAC contractors do not typically seal duct systems properly, the HVAC contractor must be informed of duct tightness requirements prior to bidding the job. This is necessary to ensure the job is done properly and within budget.

☐ **Avoid using framing cavities for ducts.**

Framing cavities (spaces between wall studs and floor joists) are often used as return ducts. These framing cavities cannot be adequately sealed under most circumstances, and should not be used as ducts.



RESOURCES

- ☐ *"Ducts Rediscovered", Home Energy Magazine, Sep/Oct 1993. Available at 510-524-5405.*
- ☐ *"Getting Your Ducts in a Row", Good Cents Building News for a Better Environment, Sep/Oct 199. Available at 1-800-653-3445.*
- ☐ *"Air Distribution for the Exemplary Home" (an excerpt from The Exemplary Home Builders Field Guide). Available at 919-857-9000, FAX orders to 919-832-2696.*
- ☐ *A Builder's Guide to Residential HVAC Systems. Available in January 1997 from the National Association of Home Builders (NAHB) Press, 1-800-223-2665.*
- ☐ *Manual D: Residential Duct Systems, 1995, 2nd printing, Air Conditioning Contractors of America. Available at 202-483-9370.*
- ☐ *Airtight Ducts in New Construction - a 3-day course on quality duct systems, offered by Alternative Energy Corporation (AEC), Raleigh NC. For information, call 919-857-9000.*